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Embedded Metadata in Cultural Image Collections and Beyond: Embedding Metadata in Image Files at CalPoly, San Luis Obispo

Abstract
This article is based on the presentation, "Embedded Metadata in Cultural Image Collections and Beyond: Embedding Metadata in Image Files at CalPoly, San Luis Obispo," given at the Visual Resources Association's (VRA) annual conference in Albuquerque, New Mexico, April 18,2012. This case study illustrates the practice of embedding metadata into image files at CalPoly's Art and Design Department's Visual Resources Collection, from its early stages to today. It will show the evolution of using embedded metadata as a method of applying descriptive label information to images, to its use in cataloging, and how the practice can lead to the discovery of digital resources that enhance teaching and learning. Developing a digital workflow within the parameters available resources and student staffing is also discussed.

Keywords
embedded metadata, digital images, workflow

Author Bio & Acknowledgements
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The success of embedding metadata into image files at CalPoly is due to the efforts of many people who have generously shared their time and expertise. John Vu created the first customized XMP panels and export and import, programing scripts. Greg Reser of UC San Diego upgraded John's panels, and developed the CSU panel and export/import scripts for the Visual Collective, the CSU system's shared digital image database. He further developed the VRA metadata panel under the auspices of VRA's DSC's Embedded Metadata Working Group (EMwg). Dr. Kathleen Cohen, Director of WorldImages, gave permission to use the images of works of art for this article. Thanks also go to colleagues in the CSU system, Vickie Aubourg, Director of the Harold Hay Media Resource Center at CalPoly, and Karen Kessel, Visual Resource Specialist at Sonoma State for their expert advice and input. Also appreciated are CalPoly's Art and Design faculty and the College of Liberal Arts for their constant support, as well as the CSU's Systemwide Digital Library Services for their work on the Visual Collective.

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It is the Visual Resources Association's (VRA) 30th anniversary and in the first day of this conference we are talking about embedding metadata into image files. The EmbARK User's group just saw a demonstration of how to move data from the EmbARK database to image files using the VRA custom panel and export/import scripts.

By now, we are familiar with the advantages of embedding descriptive metadata into image files and how it can help us with our digital workflow. As we continue this practice, we are starting to learn more about the interoperability of embedded metadata and the tools that allow us to work with it. Beyond describing images, we are learning different ways it can connect us to digital materials in collections and on the Web. While it can facilitate cataloging, it can also assist users, faculty and students, by serving as a gateway to discover more material to further scholarship.

This case study will illustrate the practice of embedding metadata into image files at CalPoly's Art and Design Department's Visual Resources Collection (VRC), from its early stages to today. It will show the evolution of using embedded metadata as a method of applying descriptive label information to images, to its use in cataloging, and how it can lead to the discovery of digital resources that enhance teaching and learning.[1]

At CalPoly we've been embedding descriptive metadata since 2004. Why did we do this? It was the result of working with one of our art history faculty who wanted to change from using slides to digital images to teach his courses and offer students course Web sites for remote study. On several occasions, he would come into the then Slide Library asking for information, not images. It might be the date of a work, or the museum where the work was located - basically information that was previously found on the slide label. This involved looking up the filename for the image in our FileMaker database. Usually we found what he was looking for, but it took time. Often the filename would be changed which unfortunately, removed the image's only connection to our database.

Interestingly, you may recall that early in the transition from analog to digital images the discussion focused primarily on image quality. Faculty felt that slides were of a higher quality than digital images and therefore resisted changing to the new format. Yet, our faculty pioneer also needed the data that accompanied the image. There was a single user database that existed on a desktop, but no online resource where faculty could remotely access information. For slides, the data appeared on the slide label, however there was no equivalent for the digital image. Clearly, we needed to find a way to make descriptive information available in the new digital format. At the very least, we needed a reliable method for looking it up in our database.

At the same time, we were trying to promote digitization in the hopes of acquiring the appropriate software, equipment, and staffing so that we could move forward and welcome the digital age with open arms. Yet, we couldn't readily provide basic data about an image that was in the digital format – this was one more check in the "con" column.

However, once faculty embraced the new medium, they wanted more, high quality images for classroom teaching, remote study on the Web, research, etc., and of course, descriptive information about the work depicted in the image. The digital medium offered faculty users additional advantages that outweighed slides. First, the immediacy

of the medium meant that digital images could be created almost instantly. There was no waiting while film was sent out to a processor. Second, there is no restriction on the number of images that can be made in the digital format, whereas slide images were limited by the number of frames on a roll of film, typically 36. Third, there is almost no limit to the number of fields of descriptive data that can be collected in a database or spreadsheet in the digital environment. On the other hand, slide information is restricted to the size of the slide label. As soon as the decision to change was made, we suddenly needed scanning equipment, data standards, specialized software, storage and staffing to accommodate the digital format. We didn't have the resources that we needed and the question became – how were we going to provide services? The reality of what we had, did not add up to what was expected for a digital workflow.

Given these parameters the reason that we began to embed metadata into image files was simply to survive. The "S.U.R.V.I.V.A.L." acronym adapted from the U.S. Army Survival Manual offers some helpful strategies that we took at the time:[2]

S Size up the situation
U Use what's available
R Remember where you are
V Vanquish fear, solve the problem (expectations vs. reality)
I Improvise
V Value living
A Act
L Learn basic skills

Sizing up the situation, using what is available and remembering where you are, was beneficial in coming up with a solution and some background is helpful. CalPoly is a four-year "comprehensive public university" where "academically focused" students can obtain a "hands-on educational experience".[3] Accredited by the National Association of Schools of Art and Design (NASAD), the Art and Design program offers a BFA in Art and Design with concentrations in Graphic Design, Photography, and Studio Art. There was no art history major or minor at the time.[4] Art history courses support the concentrations as well as provide general education courses to the university. The VRC's primary purpose is to support the instructional, research, and study needs of the Department's faculty and students. Our first priority is to provide images for classroom teaching and course sites for remote study either on individual Web sites or in Learning Management Systems (LMS) such as then Blackboard, now "PolyLearn" (CalPoly's version of Moodle).

Looking at what was available, staffing consisted of 1 professional Visual Resources Specialist (VRS) working 10 months, and 2 to 5 student assistants, typically undergraduates and non-art majors. At the time, our equipment consisted of one Power Mac G3 "Beige", and a Nikon slide scanner. Software included Adobe Photoshop and Bridge (CS 2) and an in-house, FileMaker, text-based, database for slides and digital images.

After sizing up the situation, we started embedding metadata by entering the filename into the "Document Title" field of Photoshop's "Description" XMP panel.[5] This way, if the filename was changed, we could still view it in the panel and look up

descriptive information in our FileMaker database. However, this involved too many steps and took too much time to be practical. Next, we tried to "fit" information found on the slide label into the panel **(fig. 1).**

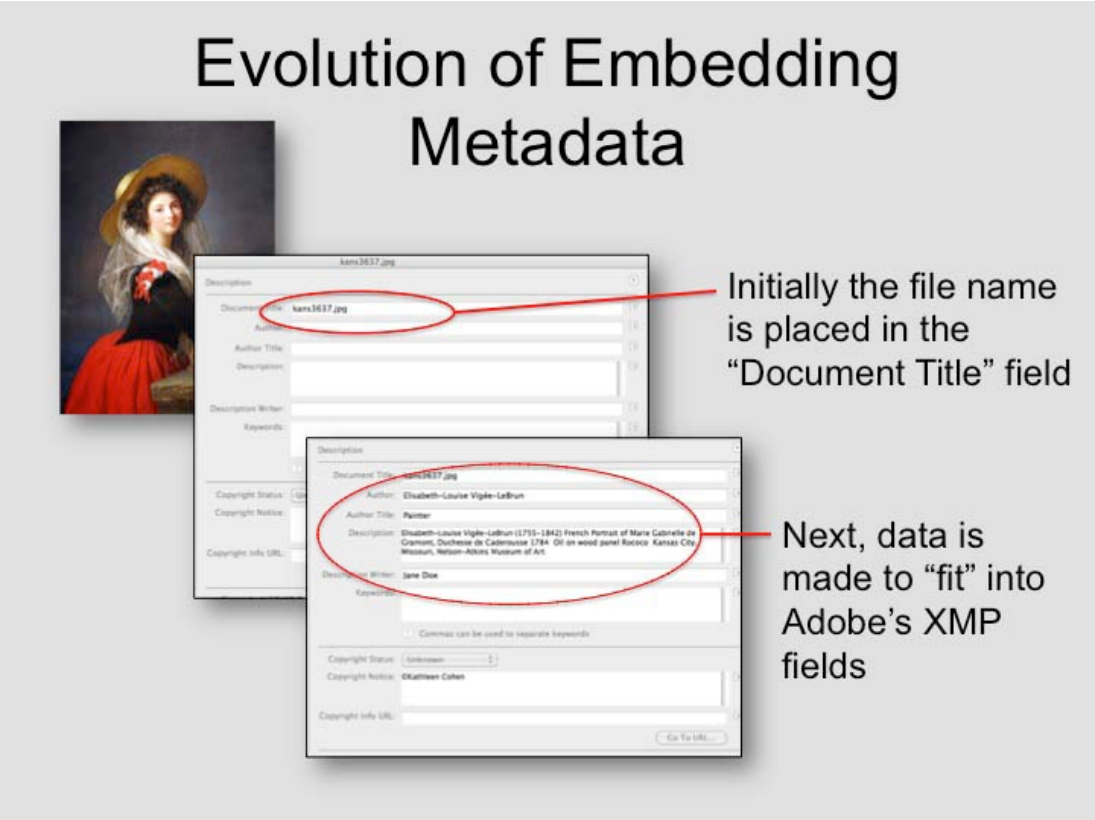


Fig.1 Evolution of Embedding Metadata: Initially the filename was placed in the "Document Title" field of Adobe's XMP Description panel. Next, data was made to "fit" into the panel's fields.

The "Author" field was used for "Creator" name, "Author Title" for "Creator Role" and the descriptive information for Creator, Title, Medium, Repository, etc., was placed in the "Description" field. Since our faculty members had access to Photoshop on their desktops, this effectively solved the problem of having descriptive information accessible. They could now view it with File Info in Photoshop. Using their computer's "Search" or "Find" feature, they could search on any term and the image would be found. Image information was no longer dependent on a database.

At the time we did not have a way to export or import metadata and we had to enter it twice, once in the panel of the image file and then again in the FileMaker database. This was inefficient. Ideally we wanted to enter data once. We began looking for programming scripts that would help us move the data around. There were scripts that allowed us to export the data out of the panel and after a few steps open it an Excel spreadsheet. However, the data still had to be cleaned up and parsed, before it could be imported into FileMaker. This was very time consuming. It was clear that if the data could be exported cleanly by using a customized panel, it could then be imported into the database more efficiently.

Fortunately the opportunity arose to hire a computer science student who loved using Photoshop and who had substantial experience working with images. After researching custom File Info panels, reading Adobe's XMP documents, and JavaScript References for Adobe Bridge and Photoshop, our student assistant developed three custom panels, and wrote export and import scripts in JavaScript (**fig. 2**).

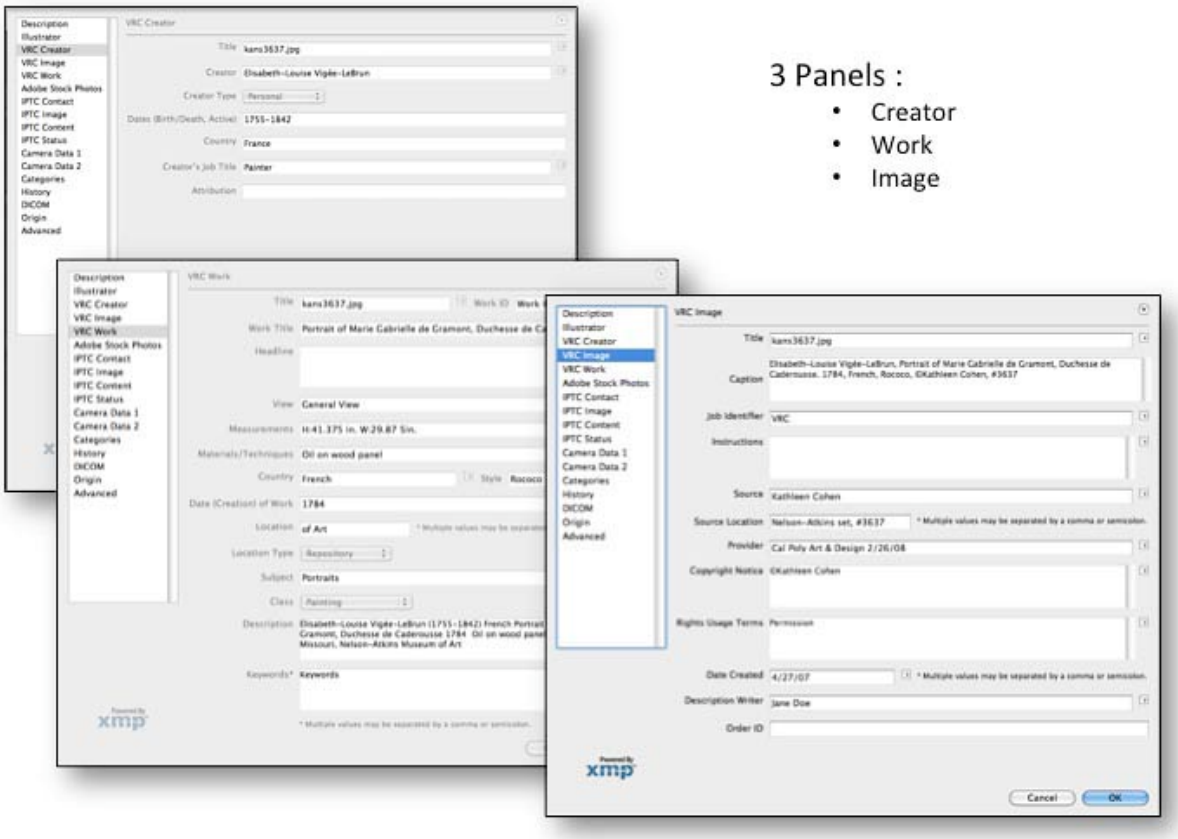


Fig. 2 Custom File Info Panels for Creator, Work and Image.

The VRA Core, served as a guideline for the fields of the panel along with various image cataloging manuals developed in the California State University (CSU) system such as WorldArt (now WorldImages) and CIELO, the California (State University) Image Exchange Library Online.[6] In addition to being accessible via the File Info feature, the fields were also available in Adobe Bridge's metadata palettes making batch cataloging possible **(fig.3)**.

Fig. 3 Bridge Palettes for Creator, Work and Image.

Batch cataloging allows metadata to be entered simultaneously for a group of images where fields share the same data, such as "Source" or "Provider". This is done by selecting thumbnail images in Bridge and entering the shared data in the field. This can speed up data entry when several works by the same artist are cataloged. In this instance, the works are selected in Bridge and the shared data for "Creator", "Creator Role", and "Creator Dates" can be entered into the fields of each corresponding image at the same time. Batch cataloging also helps to normalize data and builds a richer cataloging record. Pre-cataloging therefore can begin in Bridge where students enter metadata into the fields embedding it into the image files **(fig. 4)**.

Fig. 4 Students perform pre-cataloging in Bridge CS3.

Being able to export and import the metadata also assists with data entry. The export script pulls the embedded metadata out of the image files from Bridge saving it as a text file **(fig. 5)**. Using Excel, the text file can be opened in a spreadsheet and the data can be reviewed and checked **(fig. 6).** All the data entry features of Excel are available for bulk changes or corrections as needed. Once changes are made, the spreadsheet is saved as a tab-delimited text file. Using the import script in Bridge the data is imported back into the image files where it overwrites the original data. The interface for each script allows users to select specific fields to be exported and/or imported depending upon the corrections that are made **(fig. 7)**. Figure 8 shows an example of "before" and "after" a correction is made to the "Description" field. The information for this field is concatenated in the Excel spreadsheet and then brought back into the image file. As part of the IPTC schema the information in the "Description" field will appear in most photo software programs.[7] As before, users can search on any of the terms in this field and the image will be found.

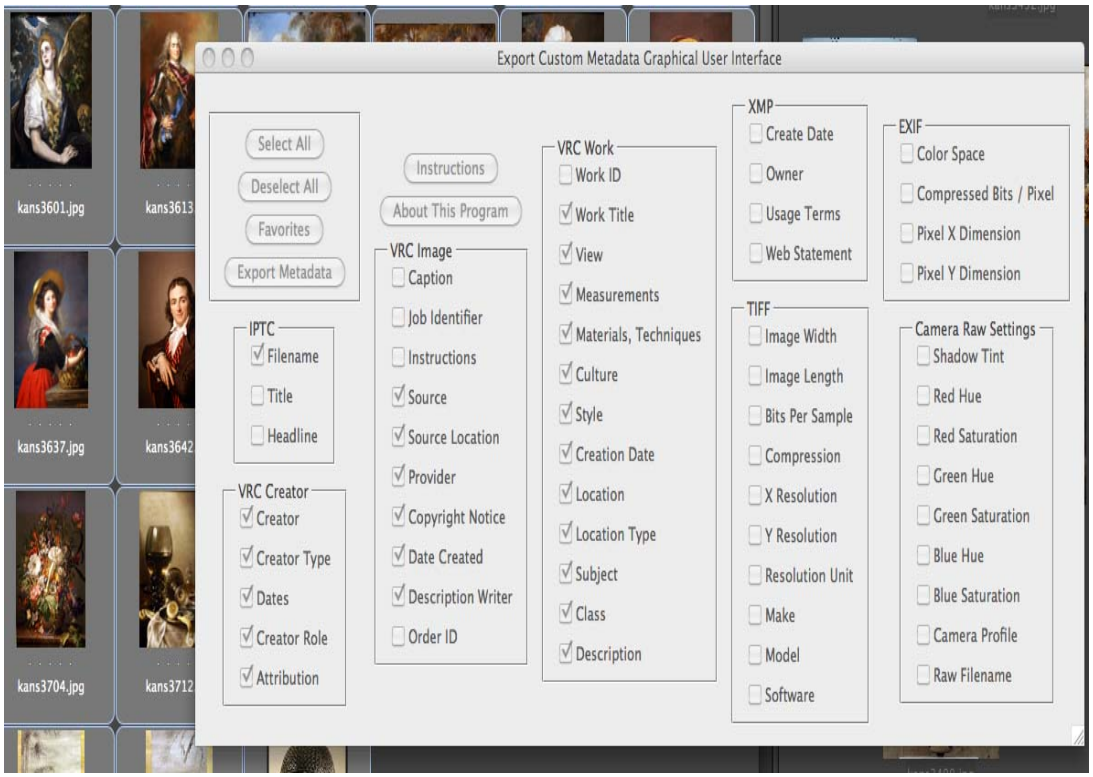
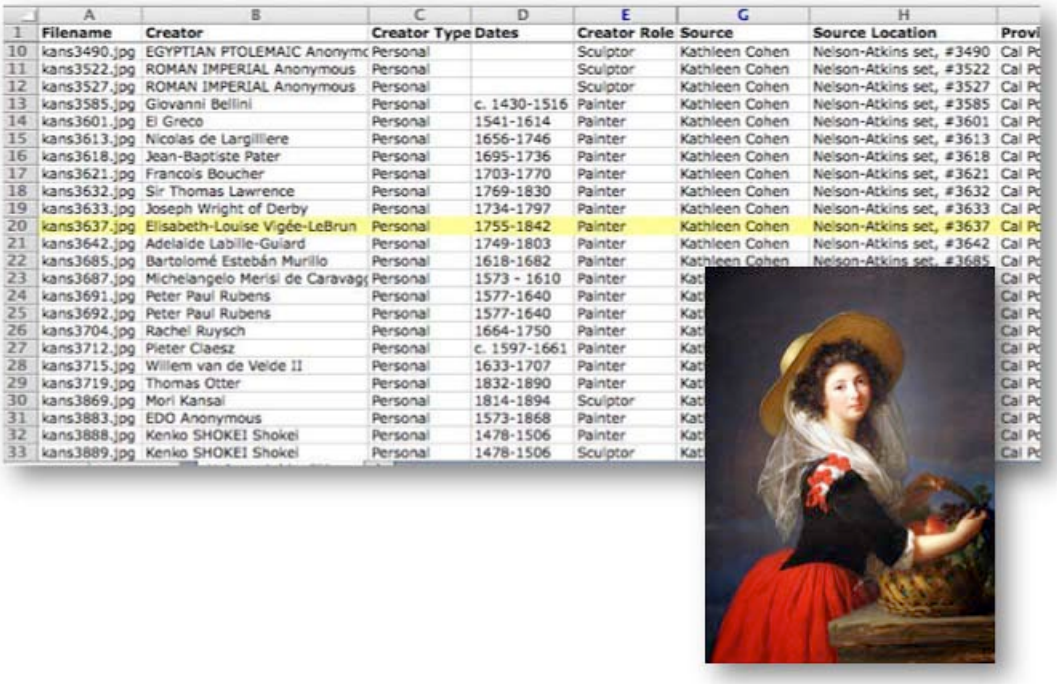


Fig. 5 Exporting data. The interface allows the user to select specific fields to be exported.



	A	B	C	D	E	G	H	
1	Filename	Creator	Creator Type	Dates	Creator Role	Source	Source Location	Provi
10	kans3490.jpg	EGYPTIAN PTOLEMAIC Anonymc	Personal		Sculptor	Kathleen Cohen	Nelson-Atkins set, #3490	Cal Pc
11	kans3522.jpg	ROMAN IMPERIAL Anonymous	Personal		Sculptor	Kathleen Cohen	Nelson-Atkins set, #3522	Cal Pc
12	kans3527.jpg	ROMAN IMPERIAL Anonymous	Personal		Sculptor	Kathleen Cohen	Nelson-Atkins set, #3527	Cal Pc
13	kans3585.jpg	Giovanni Bellini	Personal	c. 1430-1516	Painter	Kathleen Cohen	Nelson-Atkins set, #3585	Cal Pc
14	kans3601.jpg	El Greco	Personal	1541-1614	Painter	Kathleen Cohen	Nelson-Atkins set, #3601	Cal Pc
15	kans3613.jpg	Nicolas de Largillière	Personal	1656-1746	Painter	Kathleen Cohen	Nelson-Atkins set, #3613	Cal Pc
16	kans3618.jpg	Jean-Baptiste Pater	Personal	1695-1736	Painter	Kathleen Cohen	Nelson-Atkins set, #3618	Cal Pc
17	kans3621.jpg	Francois Boucher	Personal	1703-1770	Painter	Kathleen Cohen	Nelson-Atkins set, #3621	Cal Pc
18	kans3632.jpg	Sir Thomas Lawrence	Personal	1769-1830	Painter	Kathleen Cohen	Nelson-Atkins set, #3632	Cal Pc
19	kans3633.jpg	Joseph Wright of Derby	Personal	1734-1797	Painter	Kathleen Cohen	Nelson-Atkins set, #3633	Cal Pc
20	kans3637.jpg	Elisabeth-Louise Vigée-LeBrun	Personal	1755-1842	Painter	Kathleen Cohen	Nelson-Atkins set, #3637	Cal Pc
21	kans3642.jpg	Adelaide Labille-Guiard	Personal	1749-1803	Painter	Kathleen Cohen	Nelson-Atkins set, #3642	Cal Pc
22	kans3685.jpg	Bartolomé Estebán Murillo	Personal	1618-1682	Painter	Kathleen Cohen	Nelson-Atkins set, #3685	Cal Pc
23	kans3687.jpg	Michelangelo Merisi de Caravagg	Personal	1573 - 1610	Painter	Kat		Cal Pc
24	kans3691.jpg	Peter Paul Rubens	Personal	1577-1640	Painter	Kat		Cal Pc
25	kans3692.jpg	Peter Paul Rubens	Personal	1577-1640	Painter	Kat		Cal Pc
26	kans3704.jpg	Rachel Ruysch	Personal	1664-1750	Painter	Kat		Cal Pc
27	kans3712.jpg	Pieter Claesz	Personal	c. 1597-1661	Painter	Kat		Cal Pc
28	kans3715.jpg	Willem van de Velde II	Personal	1633-1707	Painter	Kat		Cal Pc
29	kans3719.jpg	Thomas Otter	Personal	1832-1890	Painter	Kat		Cal Pc
30	kans3869.jpg	Mori Kansai	Personal	1814-1894	Sculptor	Kat		Cal Pc
31	kans3883.jpg	EDO Anonymous	Personal	1573-1868	Painter	Kat		Cal Pc
32	kans3888.jpg	Kenko SHOKEI Shokei	Personal	1478-1506	Painter	Kat		Cal Pc
33	kans3889.jpg	Kenko SHOKEI Shokei	Personal	1478-1506	Sculptor	Kat		Cal Pc

Fig. 6 Data is reviewed and corrected in an Excel spreadsheet.

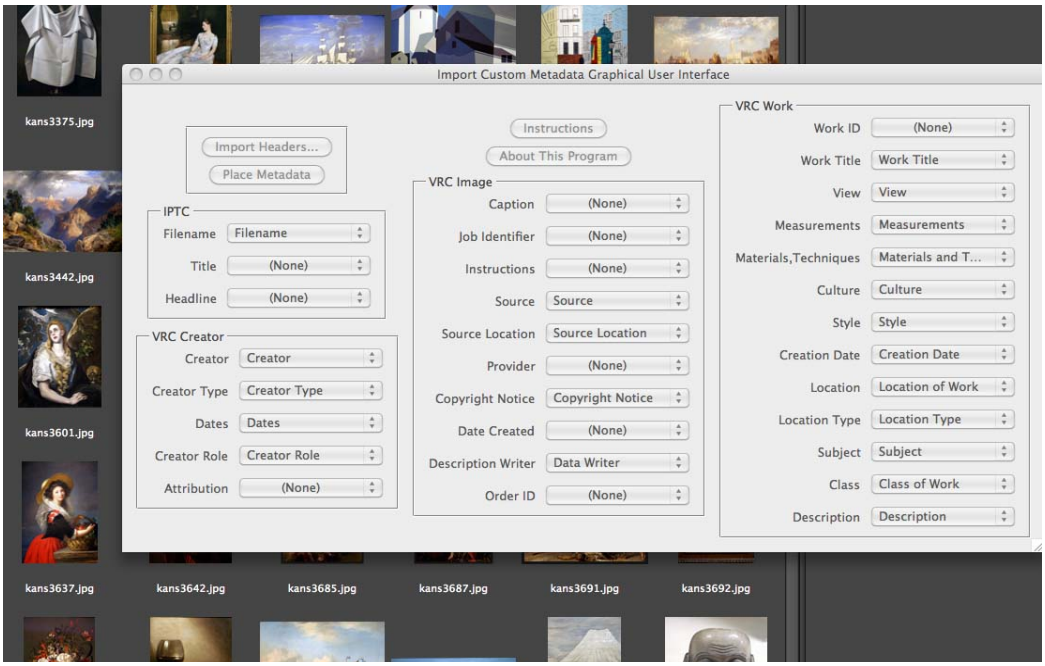


Fig. 7 Data is imported back into the image file. All of the metadata can be imported or selected fields.

Fig. 8 Example of a correction made to the Description field.

Once the data is exported cleanly, it can be repurposed for other uses. It can be moved to databases by using an Excel spreadsheet and mapping the panel's fields to those in a database such as FileMaker or Gallery System's EmbARK. It can be repurposed for course Web Sites, or LMSs such as Blackboard or Moodle. Here, the metadata in the Description field can be placed as image captions on Web pages automatically generated by Photoshop/Bridge's Web Gallery and uploaded to the Web. For Blackboard and Moodle, the files for the Web Gallery can be compressed or "zipped", uploaded and then "unzipped" allowing students to study the images remotely.

Embedding metadata into image files helped to develop a flexible workflow that takes advantage of available resources and accommodates three, ten week academic quarters. Faculty can receive their images at several points throughout the production process. Obviously, the quality of data and images increases the longer the images move through the workflow. However, images given quickly to faculty can be replaced with higher quality versions at a later time. The workflow can also be adjusted to the abilities of the student workforce. Several students can scan images from a source, enter data and process the images, each picking up where another has left off. A work tracking form lets them record their work, but also asks them to document the next task in the process. This enables students working different shifts, who may not see one another, to know where to begin their working. The students' work can easily be monitored and evaluated. Typically some students are quite good with data entry, while others have a knack for editing images and working in Photoshop. When this occurs students are assigned to these specific tasks in the workflow.

To expedite image processing, additional steps were taken to minimize the number of corrections that needed to be made by the VRS. The student assistants are undergraduate non-majors and are not familiar with art or art history, how to edit images or enter data for visual resources. After reviewing the work of a group of students, a number of consistent errors were noted. Most, involved formatting data such as

capitalization, measurements, dates, etc. As a result, the students were provided step-by-step instructions on how to enter data for each field, including a list of common errors that they could refer to as they worked through the panels.[8] Next, a peer-to-peer, or "Peer Checking" step, where students correct each other's work, was added to the workflow. A peer provided a fresh set of eyes to review the data and unexpectedly fostered competition by the students who desired to perform well for one another. As a result the quality of data improved markedly.

Figure 9, illustrates our digital workflow:

1) A faculty member requests images to be scanned into the digital format.
2) The VRS reviews the request and assigns the work to the student assistants.
3) Students scan images from the source. The images are oriented, cropped and saved as TIFF files.
4) Students collect descriptive data from the source and enter it into the panel. Depending on their expertise, they may add data from online authorities such as the Getty Vocabularies.
5) Students export metadata to an Excel spreadsheet where they review their work, make corrections, and import the data back into the image files.
6) The image data is given to another student for peer checking.
7) The images are edited and resized.
8) The VRS reviews the work and delivers the images to the faculty requestor.

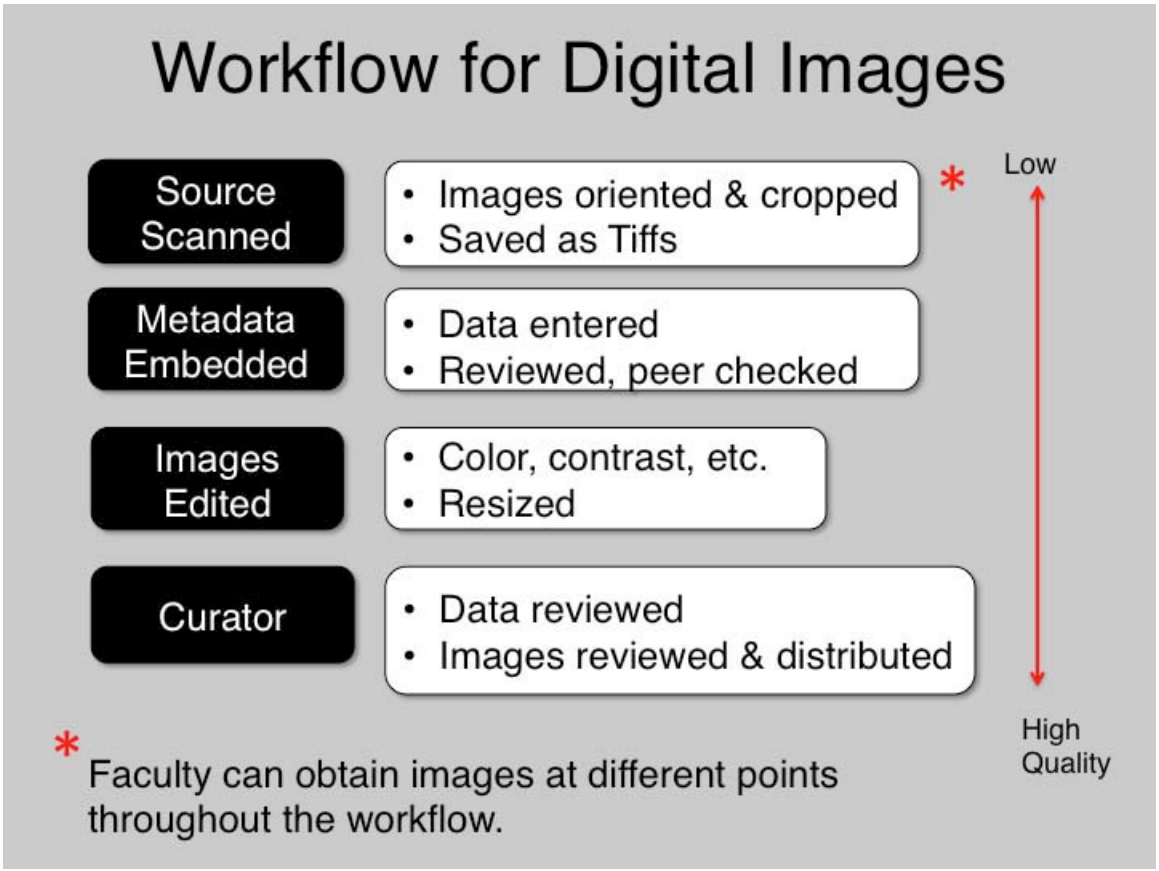


Fig. 9 Workflow for digital images.

A digital folder is created for each image request. It will contain two folders of images, one for TIFF and one for JPEG images, an Excel spreadsheet of the exported data, and a work progress form, when the request is completed. The entire folder is archived and the images and data are repurposed accordingly.

With the customized XMP panels, export/import scripts, and skilled student assistants we met the challenges of using digital images. Metadata could be moved around quite easily and we were no longer dependent on a database to locate descriptive information. However, with the release of CS4, Adobe changed the way the custom panels work with Photoshop and Bridge and text files no longer functioned. Fortunately, the export and import scripts still worked. The new versions of Photoshop and Bridge use Adobe Flex and Flash technology. Our student assistant graduated, and the question arose of how could we continue embedding metadata. We kept using CS3 as long as we could, but there was a need to create sustainable tools. Fortunately, Greg Reser, Metadata Specialist at UC San Diego helped us by creating a version of our custom File Info panel where the Creator, Work and Image panels are merged into one CalPoly panel.[9] Yet, the question of how long this technology would be sustainable remained.

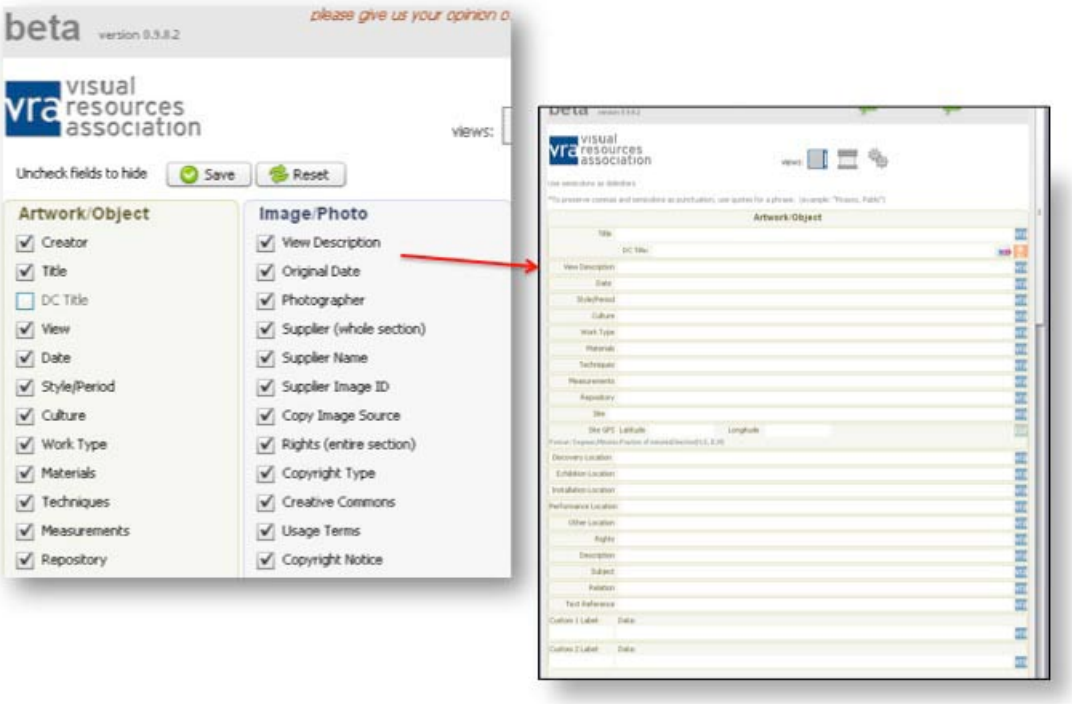


Fig.10 The VRA beta custom panel showing the customization menu (left) and the data entry panel (right).

Next, Greg developed the VRA panel under the auspices of VRA's Data Standard's Committee's Embedded Metadata Working Group (EMwg) (**fig. 10**).
The VRA panel is more complex, follows the VRA core more closely, and offers a highly customizable user interface than the previous text file panels could. Like the earlier panel, metadata is entered and embedded into the image file via the File Info and Bridge's palettes features. By addressing the larger visual resources community, more images and data can be shared without the need of a database or separate spreadsheets. The support of the EMwg and therefore VRA also meant that the practice of embedding metadata in image files and the technology and tools that accompany it, gained acceptance from the profession. As a result there is a better chance that the practice will thrive and be both sustainable and interoperable.

Moreover, the panels can be customized and tailored to specific projects. Again with the help of Greg, a panel has been developed for use in the CSU system **(fig. 11)**. Its purpose is to streamline the data workflow from capture to

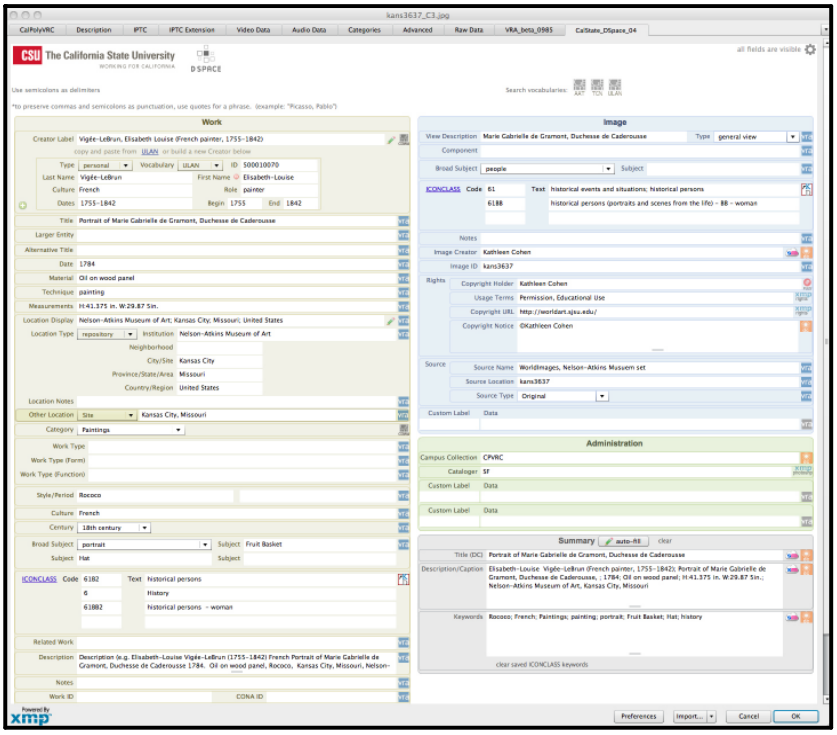


Fig. 11 The CSU Panel.

upload to the CSU's Visual Collective, an online image repository built in DSpace. DSpace is an open source program for digital repositories that is available at the system level since it can accommodate digital collections held by the 23 campuses in the system. Additional programs have been added to the Visual Collective to assist DSpace with handling images.[10] Depending upon licensing and image rights, images are accessible

only to those who have permission to view them. The Visual Collective required a panel that provided more granularity of data than the VRA panel offers. Metadata is exported into a template, basically an Excel spreadsheet, and batch uploaded with images to DSpace. While based on the VRA panel, the CSU panel has additional features that facilitate cataloging. For example, Greg developed a feature that links online data by automatically pulling in subject terms from Iconclass, an authority on iconography available on the Web, into the panel.[11] The Visual Collective is still under development and we hope to see other resources, such as the Getty Vocabularies, linked to it. With the CSU panel, embedding metadata has evolved from labeling images to full fledge cataloging.

Another advantage of embedding metadata is that it can ultimately lead faculty and student users to discover additional resources. Users can research the name of the artist, culture, period, date, etc., when the information is accessible. Information in the "Source" field helps users find material about the work and as well as the context in which it was depicted. For instance, is the work a part of a collection, included in an exhibition, from an archeological site, or illustrated in a monograph? When images come from books, online tools such as Google Books can help student users learn more about the work. For instance, when a book is available online in Google Books, students can view its reference page. Here, they can see a preview of the book, find out if they can borrow it from a local library and/or where they can purchase it from a vendor. An image with embedded metadata, like a term in an index, becomes an access point to additional information outside of the catalog record. On the other hand, without embedded metadata, the identity of the image is lost and the user has no point of reference to begin research.

At CalPoly embedding descriptive metadata in image files results in self-describing and portable images that benefit users and the digital workflow. Users can 1) receive their images sooner rather than later, 2) access information that would otherwise be unavailable, 3) search their computer for images using the operating system's "search" or "find" features, and 4) discover additional information for their research. In an environment of restricted resources and funding the workflow is improved by 1) bulk or batch data entry and editing, 2) repurposing data for other uses such as databases, and/or course Web or LMS sites, and 3) data sharing outside of a database to facilitate access. In situations where an online image database isn't possible, embedding metadata is an alternative way to keep track of images.

As the amount of digital images being produced increases exponentially, S.U.R.V.I.V.A.L. remains to be an excellent reason to continue to embed metadata. 250 million images are uploaded to Facebook daily while 4.5 million are added to Flickr.[12] Johnathan Good of 1000 Memories Blog says that "we take 4 times as many photos as 10 years ago," that we have taken 3.5 trillion photographs altogether, and justifiably that they represent a "rich portrait of today".[13] Without descriptive data, digital images, like slides without labels, will lose their cultural context. In this deluge of images how will future users know what they are looking at? Embedding descriptive metadata in image files offers us the chance to survive.[14]

[1] To find out more embedding metadata into image files see the VRA's Embedded Metadata Working Group's (EMwg) Wiki, "Metadata Deluxe: send your images packing with embedded metadata," http://metadatadeluxe.pbworks.com/w/page/20792238/FrontPage, August 31, 2012.
[2] United States. Dept. of the Army, The U.S. Army Survival Manual: Department of the Army Field Manual 21-76 (Berkeley, Ca.: Ulysses Press, 2009), p.3.
[3] California Polytechnic State University, "CalPoly, San Luis Obispo: Admissions: Prospective Students," *CalPoly: San Luis Obispo*, August 31, 2012, http://admissions.calpoly.edu/prospective/
[4] Today, CalPoly's Art and Design Department offers an Art History minor.
[5] Adobe XMP (Extensible Metadata Platform). See: http://www.adobe.com/products/xmp/ www
[6] See WorldImages (http://worldart.sjsu.edu/). CIELO, was a system-wide digital image database developed in 1998, and was later incorporated into the WorldImage database.
[7] IPTC (International Press Telecommunications Council) http://www.iptc.org/site/Home/
[8] The instructions for formatting data follow the CCO, *Cataloging Cultural Objects: A Guide to Describing Cultural Works and Their Images*. Murtha Baca, *Cataloging cultural objects: a guide to describing cultural works and their images*. Chicago: American Library Association, 2006. (See also CCO Commons at cco.vrafoundation.org
[9] Greg is the Chair of VRA's Data Standard Committee's Embedded Metadata Working Group and is a member of the recently formed international Cultural Heritage Embedded Metadata (CH EM) group that is working on a panel for cultural heritage materials. The VRA panel and export/import scripts can be downloaded at: http://metadatadeluxe.pbworks.com/w/page/32300275/VRA-XMP-Info-Panel-(beta)
[10] SourceForge's djatoka viewer has been added to the Visual Collective and allows for zooming and selecting the current view. Users can zoom in on an image creating their own detail and save it to their desktop.
[11] http://www.iconclass.org/. See Greg's presentation on SlideShare. "Embedded Metadata and the do-it-yourselfer" Embedded metadata in cultural image collections and beyond. Visual Resource Association's annual conference, Albuquerque, April 18, 2012. http://www.slideshare.net/VisResAssoc/vra-2012-embedded-metadata-embedded-metadata-and-the-doityourselfer
[12] Infographic Labs. "Facebook 2012." http://infographiclabs.com/news/facebook-2012/. Inforgraphic Labs, February 15, 2012. Web. 11 April 2012. "Flickr." *http://advertising.yahoo.com/article/flickr.html.* YAHOO! Advertising Solutions. Content Solutions. Web. 11 April 2012.
[13] Johnathan Good, "How many photos have ever been taken?" 1000 Memories Blog, September 15, 2011. August 30, 2012. http://blog.1000memories.com/94-number-of-photos-ever-taken-digital-and-analog-in-shoebox

[14] The success of embedding metadata into image files at CalPoly is due to the efforts of many people who have generously shared their time and expertise. John Vu created the first customized XMP panels and export and import, programing scripts. Greg Reser, Metadata Specialist at UC San Diego, upgraded John's panels, and developed the CSU panel and export/import scripts for the Visual Collective, the CSU system's shared digital image database. He further developed the VRA metadata panel under the auspices of VRA's DSC's Embedded Metadata Working Group (EMwg). Dr. Kathleen Cohen, Director of WorldImages, gave permission to use the images of works of art for this article. Thanks also go to colleagues in the CSU system, Vickie Aubourg, Director of the Harold Hay Media Resource Center at CalPoly, and Karen Kessel, Visual Resource Specialist at Sonoma State for their expert advice and input. Also appreciated are CalPoly's Art and Design faculty, including our faculty pioneer, and the College of Liberal Arts for their constant support, as well as the CSU's Systemwide Digital Library Services for their work on the Visual Collective.